related structures, also the ciliated apparatus of the Ctenophore may be compared with the preoral ciliated band of the Trochophora. We would assume that the cœlom sacs and nephridial canals of the Zygoneura (sac-gonads of the Scolecida) are derived from the gastric canals of the Ctenophores, and therefore that the mid-gut of all Zygoneura may be compared morphologically only with the central stomach of the Cœlenterates in general and the Ctenophores in particular, and not with the whole primitive digestive system of cœlenteric apparatus, as Lang has done."

ENTOMOLOGY.[1]

"Biological Papers."—With this general title Prof. Charles Robertson, of Carlinville, Illinois, has recently distributed, under one cover, a series of admirable papers on flowers and insects, and descriptions of North America Hymenoptera. In his studies of the former subject the author has followed closely along the lines laid down by Müller in his "Fertilization of Flowers," describing the structural peculiarities of the blossom of each plant considered, and the relative time of development of each part, and cataloguing both the species of insect visitors and the object of their visit. The length of these catalogues indicates an amount of careful field work which will be best appreciated by those who have tried it.

Lepidoptera of Buffalo.—The last number of the Bulletin of the Buffalo Society of Natural History contains an excellent "List of Macro-Lepidoptera of Buffalo and Vicinity" by Edward P. Van Duzee. In its preparation the author has been assisted by Dr. D. S. Kellicott, Mr. A. H. Kilman, Mr. Philip Fisher, and other members of the society. The list includes the Geometridæ and Pyralidæ, but omits the Tortricidæ and Tineidæ. The total number of species is 777, of which 361 are Noctuidæ. The same issue of the Bulletin contains an account of "Mill's Collection of Fresh-Water Sponges," by Dr. Kellicott.

Kerosene Emulsion.—In Bulletin No. 16 of the Michigan Experiment Station Prof. A. J. Cook discusses "Kerosene Emulsion and Its Uses." The article is evidently the result of a large amount of careful experimentation of the highest practical value, in which the

[1] Edited by Prof. C. M. Weed, Hanover, N. H.

author has been assisted by Mr. G. C. Davis. Prof. Cook describes under separate headings three formulæ for preparing the emulsion: the first is his own method of making an emulsion of soft soap and kerosene; the second, his method of making an emulsion of hard soap and kerosene; and the third is the well-known Riley-Hubbard formula. For success with the latter the experiments here reported indicate that soft water must be used. Th authors believe the pyrethro-kerosene to be a valuable insecticide, and report experiments in which kerosene emulsion has been successfully used against vermin on domestic animals, rose chafers, hollyhock bugs (*Orthotylus delicatus* Uhle.), yellow-lined currant bugs (*Pœcilocapsus lineatus* Fab.), immature squash bugs, aphides, pear slugs, and pea weevils. The Bulletin is illustrated by eight original figures, and altogether is one of the most useful and interesting of recent station publications.

Host-Plants of Aphididæ.—Mr. T. A. Williams nas lately published as Bulletin No. 1 from the Department of Entomology of the University of Nebraska a "Host-Plant Index of North American Aphididæ." There is a short introductory discussion of plant lice by Prof. Lawrence Bruner, after which follows a list of North American plants and the species of Aphides which attack them.

Prof. Smith on the Rose-Chafer.—Bulletin No. 82 of the New Jersey Experiment Station consists of an extended discussion of the rose-chafer or "rosebug" (*Macrodactylus subspinosus*) by Prof. J. B. Smith, who states that "this insect has done more injury during the few years last past than any one other species in the state of New Jersey, excepting, perhaps, the codling moth and plum curculio." The author gives under successive headings an account of its history in New Jersey, food habits, mouth parts, habits of the beetle and larva, breeding grounds, life history, and remedies. Under the latter heading he reports experiments showing that for practical purposes in a region where the insect is so abundant the following substances have little or no remedial value: the arsenites, copper mixtures, pyrethrum, kerosene, lime, tobacco, acetic acid, quassia, digitalis, corrosive sublimate, muriate of ammonia, cyanide of potassium, "odorless insecticide," sludgite, kainit, alum, and hot water. The latter substance, which has lately been recommended by the *Rural New Yorker* as a rosebug remedy, was found to kill the beetles at a temperature of 125°, but the difficulty of applying it successfully was so great, on account of the cooling caused by evaporation, that it proved a failure

in the field. Professor Smith has found mechanical devices for collecting the bettles the best way of fighting them, and expresses the belief that they can be successfully subdued in this way.

Heteroptera of Tennessee.—Professor Summers[2] has gotten together a very useful synopsis of the Heteroptera of Tennessee. It follows the general lines laid down in Comstock's discussion of this group in his "Introduction to Entomology" (a discussion, however, in which Professor Summers's aid is frequently acknowledged by the latter author), and is illustrated by 14 figures and one plate. Two pages are devoted to a general discussion of remedies.

Entomological Personals.—During the last few months a number of American entomologists have changed locations. Dr. J. C. Neal, of the Florida station, has resigned to take the directorship of the new Oklahoma Station at Stillwater. Mr. C. W. Woodworth has gone from Arkansas to California, where he is located at the experiment station at Berkeley. Mr. F. J. Niswander, assistant to Professor Cook at the Michigan Agricultural College, has gone to the University of Wyoming at Laramie. Mr. C. P. Gillette, of the Iowa station, has accepted the professorship of zoology and entomology at the Colorado Agricultural College, and Prof. Herbert Osborn has taken charge of the Iowa station work. Mr. A. B. Cordley has left the University of Vermont to become an assistant of the U. S. Division of Entomology. An appointment of peculiar fitness is that of Mr. Frank Benton to the apiarian work of the same division. Mr. Benton is a graduate of the Michigan Agricultural College, and has spent the last ten years in Cyprus and other eastern countries studying and experimenting with bees. Dr. Riley has also arranged for other apicultural work by appointing Professor A. J. Cook and Mr. W. R. Larrabee field agents of the division. Mr. C. H. Tyler Townsend has left Washington to accept a chair at the New Mexico Agricultural College. Mr. F. M. Webster has gone from Indiana to the Ohio station at Columbus, where he is consulting entomologist, taking the place vacated by the editor of this department when he went to the New Hampshire State College. A foreign change that is worthy of notice is that of Professor T. Thorell, the veteran arachnologist, from Sori, Italy, to Montpelier, France.

Outlines of Entomology.—Miss Murtfeldt is to be congratulated on the admirable way in which she has gotten together an intro-

[2] The True Bugs, or Heteroptera, of Tennessee. By H. E. Summers, Consulting Entomologist. Bull. Tenn. Exp. Station, Vol. IV., No. 3, July, 1891, pp. 31.

ductory discussion of insect classification.[3] She has divided her work into thirty-one chapters, the first five of which deal with the external structures of insects and their transformations. Then the orders and suborders are taken up in regular sequence, and their characters clearly and concisely defined. We are glad to learn that the author intends to have these "Outlines" published in book form for school purposes.

Recent Bulletins.—Mr. F. M. Webster begins his work at the Ohio station by a timely discussion of the Wheat Midge, *Diplosis tritici* (Bulletin, Vol. IV., No. 5, September, 1891). This pest has appeared in Central Ohio in considerable numbers.——Professor F. J. Niswander discusses plant lice in a five-page Bulletin (No. 2) issued by the Wyoming station in August.——In Bulletin No 3 of the New Mexico station Professor C. H. Tyler Townsend discusses a number of fruit insects.——In the report of the Maine station for 1890 Professor F. L. Harvey gives a popular account of a number of injurious insects which have attracted attention during the year.——Professor J. B. Smith's account of his year's work in the 1890 report the New Jersey station contains many results of great practical value.

MICROSCOPY.[1]

Methods of Preserving Human Embryos.—It frequently happens that human embryos which come into my possession are almost ruined by the physician's carelessness in preserving the material. For instance, I have obtained specimens simply placed in water, a solution of policylic acid, strong alcohol, or simply packed in cotton or even forced into a small bottle. Any of these methods almost totally spoil the specimen for careful study.

An abundance of material comes into the hands of the physician, and through his kindness it becomes possible to throw as much light on human embryology as on that of any of the other mammals. During the last few years several embryologists, especially Prof. His, have not only added a great deal to our knowledge of human embryology, but

[3] Outlines of Entomology. Prepared for the use of farmers and horticulturists. By Mary E. Murtfeldt. Report of the Missouri State Horticultural Society for 1890. Also issued separately, pp. 130, Figs. 48.

[1] Edited by C. O. Whitman, Clark University.